BOOK REVIEWS.

POST-DARWINIAN QUESTIONS, HEREDITY AND UTILITY. Part II. of *Darwin, ana After Darwin.* By the late *George John Romanes, M. A., LL. D., F. R. S.* Chicago: The Open Court Publishing Company. 1895. Pages, 344. Price, $1.50.

The second part of the admirable work, *Darwin, and After Darwin*, has been long anticipated with its promise of a clear expression of Mr. Romanes's views upon the most vital problems of contemporary evolution.

The preparation of Part II. was frequently interrupted by the author's illness and was suddenly terminated by his untimely death. It now finally appears with the able editorial supervision of Prof. C. Lloyd Morgan. Although written under many difficulties, Mr. Romanes's best qualities shine forth in this volume,—his absolute independence of opinion, his clear, critical faculty, his earnest desire to arrive only at the truth. None of his English contemporaries have shown the two former qualities in so marked a degree, excepting perhaps his own editor. At the outset the introductory chapter upon the Darwinism of Darwin and of the Post-Darwinian schools sets forth in a more lucid manner than has been seen before the differences of the newer "Schools." These differences shade into each other as gradually as the colors of the spectrum when we pass from the Anti-Selectionists (Sachs, Pfeffer, and Henslow), Neo-Lamarckians (Spencer, Cope, Eimer), Darwinians (Romanes, Galton), Neo-Darwinians (Wallace, Poulton), to the Weismannians. Considering the tenets of these Schools in the above order, we observe that the factors of self-adaptation, definite variation and evolution guided by inheritance, fall from their maximum to their minimum while the factors of evolution guided by fortuitous variation and natural selection rise from their minimum to their maximum. Thus the two extremes of *law* and of *fortuity* respectively as the basal phenomena of evolution are diametrically opposed.

We feel that a fine, clear mind has shaped this and the succeeding chapters, but not a master mind. We feel the lack of a high order of originality and the failure to grasp the significance of all the evidence now available from physiology, botany, zoölogy, and palæontology. Apparently, no man of our time has the genius to marshal in their proper order the countless discordant facts from these four

quarters of biological research and fully state the problem which is now far broader than that which faced Darwin. We are glad to add as a tribute to our late lamented author that his vision has been clearer and broader than that of ninety-nine out of every hundred of his contemporaries, and that we shall sorely miss him from among our counsellors.

Following this introductory historical and critical chapter the author proceeds to the two main subjects of his work; not to the whole subject of Heredity, but to the special problem of Inheritance of Acquired Characters, and secondly to the Wallace-Weismann doctrine of Utility, leaving Isolation and Physiological Selection for a third Part. As regards inheritance, he nowhere defines his views more positively than in the following paragraph:

"For my own part, as stated in the *Examination*,[1] I have always been disposed "to accept Mr. Galton's theory of Stirp in preference to that of Germ-Plasm on "this very ground—i. e., that it does not dogmatically exclude the possibility of an "occasional inheritance of acquired characters in faint though cumulative de-"grees."

In other words, he accepts the "*continuity*" without the absolute "isolation" of the hereditary substance, and goes on to say that the only question in debate is whether, as Darwin believed, causes of the Lamarckian order modifying "continuity" are not absolutely necessary in order to explain some of the phenomena of evolution. The evidence available on either side is presumptive, not demonstrative. The logical position of one side is as strong as that of the opposite side and high authorities are very evenly divided. Among various kinds of evidence, Mr. Romanes thinks lightly of that advanced by the American palæontologists, classing it as indirect, and in the reviewer's opinion failing to recognise that palæontological evidence is entirely unique in that it gives the whole history of many adaptive characters. On the other hand he holds that in the neuro-muscular machinery, in the domain of reflex actions and instinctive actions, we may expect to find our best indirect evidence of use-inheritance as an evolution factor, for here the principles of co-ordination and co-adaptation reach their highest point. It is satisfactory to learn definitely that Mr. Romanes took his final stand with Darwin and Spencer in regarding instinct as inherited habit, but we are disappointed to find that his opinions rest wholly upon logical considerations.

After thus far committing himself to the Lamarckian theory, he immediately proceeds to take the inconsistent position that the whole line of evidence for the inherited effects of use and disuse in anatomical characters is practically worthless. The apparent influences of disuse may, he thinks, be wholly explained by his principles of "Cessation" and "Reversal of Selection" (Weismann's Panmixia), and we cannot help feeling here that he shows some favoritism for his own mental offspring. In criticism of this theory of degeneration, we cannot direct attention too

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[1] *Examination of Weismannism*, The Open Court Publishing Company, Chicago.

strongly to the one illogical vein which runs through the book, namely, the assumption that certain body-cell activities are inherited while others are not, for of one fact we may feel absolutely confident, either that the Lamarckian principle is operative alike through all the live tissues containing chromatin or it is not operative at all. We cannot agree with the author that the effects of habit in the cells of the nervous system are transmitted while those in bone and muscle cells are not.

Strong as is the argument from nascent and full-fledged reflexes, we are now satiated with logic and crave experiments of the kind Lloyd Morgan is now making. It is unfair, however, to leave the impression that Mr. Romanes was of the pure logic school. He here informs us of several very ingenious lines of experimental work which he carried on for years uniformly without success (*vide* pp. 143–149), and the most original section of the present work is the full account of his repetition of the celebrated experiments of Brown-Séquard. His object was to verify these experiments and especially to meet the well-known criticism of Weismann, that the alleged transmission of induced epilepsy is due to germinal infection. His most successful operation was in the production of haematoma and dry gangrene of the ears by an injury to the restiform bodies of the brain. As regards the parents operated upon, the ear degeneration is very complete and supervenes after several weeks or months. In the progeny the morbid state occasionally reappears. It always affects members of the *same litter* at the same time and extends as a rule only to the middle third of the ear. Weismann's infection hypothesis is disproved by the failure of inoculation to produce similar results. Altogether, Mr. Romanes's experiments fully corroborate those of Brown-Séquard in principle, if not in all details, and together with those of Westphal and Obersteiner seem to establish conclusively that a profound localised injury to the nervous system is occasionally followed by the transmission of similar localised results.

It does not appear that either of these investigators undertook a microscopic examination of the restiform bodies in the progeny in order to ascertain whether the effects of mutilation were transmitted.

The author then cites the striking modifications of higher plants by change of environment under the experiments of Hoffmann, Carrière, Lesage, Bailey, Henslow, and others. It is to these modifications that the term "self-adaptation" has been applied. They undoubtedly furnish the most complete disproof of the adequacy of the "selection" theory, but Mr. Romanes certainly errs in placing them in the column of evidence of transmission of acquired characters, for the very suddenness of these environmental changes proves that we are witnessing an individual *saltation*, rather than a slowly inherited modification. A seashore plant transported to dry soil jumps into a new type as a matter of purely *individual growth*. The new type is accumulative in successive generations, and thus undoubtedly in nature, as Buffon observed a century ago, "many species are no longer what they formerly were." But just when we are forming the apparently safe induction that these somatogenic characters have become blastogenic we transport the highly modified

descendant to its old seashore home, and, *presto*, the original type reappears. The causes and extent of these remarkable "adjustments of internal relations to external relations," to use Spencer's phrase, remain to be more thoroughly investigated. They furnish the main motive of the anti-selectionists as well as the basis of the new teleology of such writers as Driesch, who believes that the purposive direction of the activities of protoplasm constitutes a problem as insoluble as the nature of life itself. Driesch does not find in these phenomena a proof of the specific Lamarckian problem, nor can we. In fact, it is essentially a distinct problem, which has arisen since Lamarck's and even since Darwin's time, although suggested by some of Darwin's critics, such as Asa Gray.

The latter half of the work, devoted to the utility problem, opens with the demonstration that Darwinism is primarily a theory of the origin of adaptations; secondarily, of the origin of species and of all natural divisions of animals and plants. This is followed by a detailed review of the whole subject of the usefulness or neutrality of characters of different kinds in the struggle for existence. As in the earlier sections, Mr. Romanes shows conclusively that he has Darwin upon his side and that the Wallace-Weismann position is ultra-Darwinian.

Like the original volume, this is an excellent work to place in the hands of students, from its singularly fair and accurate treatment of Post-Darwinian questions. We close it with renewed regret that the conclusion must come from another hand.

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MIND AND MOTION AND MONISM. By the late *George John Romanes, M. A., LL.D., F. R. S.* New York and London: Longmans, Green, & Co. 1895. Pages, 170.

This posthumous edition of the late Prof. George John Romanes's articles *Mind and Motion and Monism* outlines the philosophical basis of his religious position as set forth in his *Thoughts on Religion*. Professor Romanes advocates the theory of parallelism between mind and motion as now accepted by all scientific psychologists, according to which a thought or sensation is regarded as the psychical aspect of a brain-motion, and a brain-motion as the physiological aspect of a psychical event of some kind. We observe the motions of our fellow beings and conclude that their actions are accompanied with feeling the same as are our own actions of like kind. We observe objects only and objective motion, but we suppose them to be animated according to their organisation. This theory is called Monism, combining the two one-sided positions of spiritualism and materialism. Clifford calls the soul with which we endow the motions of our fellow creatures, an eject (in contradistinction to "object"), and concluding that even physical events possess an aspect that is analogous to the psychical aspect of brain-motion, speaks of the world as an eject. Romanes endorses Clifford's theory but makes his own application. Considering the fact that all motions have their psychical aspects, he concludes that we cannot know what psychical value the cosmic motions of planets